IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 10, Issue 6, June 2022

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.165

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 6, June 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1006030 |

A Smart Multisensor Approach to Assist Blind People using OCR Technology

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ABSTRACT: Optical Character Recognition is one of branch of computer vision. It is a sub-class of Artificial Intelligence. The method of converting optically scanned bitmaps of printed or handwritten text into audio output with the Raspberry Pi is known as optical character recognition (OCR). OCR technologies are already in use in a number of languages around the world. The moving object region is extracted using a mixture of Gaussians based background subtraction approach. Text localization and recognition is used to get text information. To autonomously localize the text regions from the object, an Ada boost model was employed with a text localization and Tesseract technique using gradient characteristics of stroke orientations and distributions of edge pixel. The characters in the localized text in binary, which optical character recognition software can recognize. The detected text codes are spoken to the blind users. The proposed text localization algorithm performs well. The character codes in the text file are processed using a Raspberry Pi device, which recognize characters using the Tesseract algorithm and Python programming, and the audio output is listened to when the recognition process is completed.

KEYWORDS: IoT, GSM, GPS

I. INTRODUCTION

The inability to read is one of the most difficult challenges that a blind person faces. Text can be found in a variety of places, including bulletins, billboards, and digital section.Blind people face numerous challenges. There have been advancements in mobile phones and computers that assist blind people by merging computer vision tools with other current efficient goods like the Optical Character Recognition (OCR) technology. However, in order to create appropriate aids, a deeper understanding of the requirements and talents of the visually impaired is required. Electronic assistive devices for the visually handicapped have yet to gain traction, owing to customer apprehension. The reasons for this occurrence must be found in the device's insufficient form of information, expenses, aural signals (the natural echo is masked), training challenges, cosmetics, expensive installation, and poor diffusion. Obstacle avoidance and navigation are two issues that arise as a result of blindness in mobility. The existence, placement, and nature of barriers; the texture, slope, and borders of the path or travel surface; and spatial orientation are all widely acknowledged as necessary for assisting blind pedestrians. The proposed method aids blind persons by capturing and then reading the text to them. OCR is used to extract the text that is present. It is a strategy for transforming images of writings on labels, printed books, and other printed materials. OCR identifies white spaces and replaces binary images with text. It also checks for the consistency of the detected text.

II. RELATED WORK

In 2019"The "Text to Speech for the Visually Impaired" was proposed by Mrs .Shilpa Reddy K, Mounika S.k, Pooja K, and Shana N.OCR Technology is used to convert text to speech for the visually impaired. CONS: A huge database and a hard-coded combination of word.[1] Mallapa D.Gurav1, Shruti S. Salimath, Shruti B. Hatti, Vijayalaxmi I. Byakod, Shivaleela Kanade suggested "A Reading Aid for the Blind People Using OCR and Open CV" in 2017. In the design and development of a virtual digital library, we use information in grid format for pattern recognition and to perform document image analysis (DIA). CONS: Text only works with printed text; it does not work with handwritten text. [2] Suchita Wankhade, Mrunali Bichukale, Shruti Desai, Shraddha Kamthe, and Archana Borate suggested "Smart Stick for Blind People with Live Video Feed" in 2017. The methodology employed is a smart system, which is nothing more than a smart device that assists visually impaired people in detecting obstacles using a blind stick. CONS: They are unable to detect hidden yet extremely dangerous to the blind obstructions such as downhill steps and holes.[3] Ms. Kirti P. Bhure and Mrs. J.D.Dhande proposed "Object Detection Methodologies for Blind People" in 2017. The proposed methodology includes a survey and study of numerous assessments for the technologies utilised in the task of object identification. CONS: For visually impaired people, item identification is a difficult task. [4] Wajdi Farhat, Hassene Faiedh, Chokri Souani, and Kamel Besbes suggested "Novel Approach for Real Time Detection and

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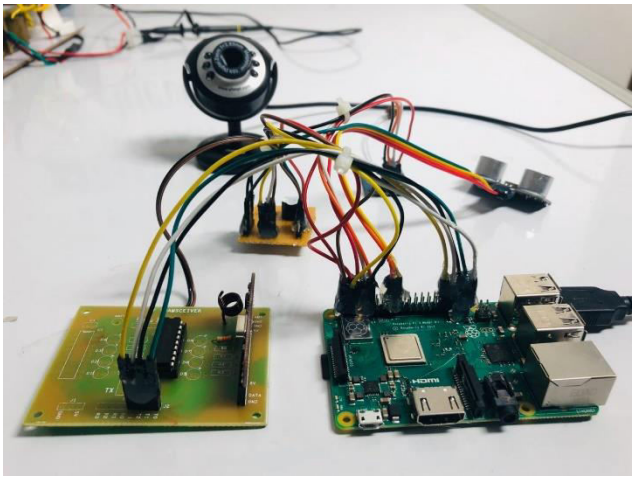
Classification Based on Template Matching in Video" in 2015. The algorithm has detected traffic signs based on the colour and form property of segmentation colour in HSV colour space, particularly red and blue. PROBLEMS: You can't check for rotations or scaling. [5]

III. PROPOSED ALGORITHM

We've presented a prototype system for assisting blind people by reading printed text on hand-held devices. We presented a motion-based method to identify the object while the blind user just shakes the object for a few seconds to overcome the typical aiming difficulty for blind users. To ensure the effectiveness and robustness of the entire system, the automatic ROI detection and text localization methods were separately verified as unit tests.We then used photos of hand-held objects captured by ten blind people in person to test this prototype system of assistive text reading. To prepare for the system test, two calibrations were used .We first advised blind individuals to position a hand-held object within the camera's field of view. We used a camera with a rather wide angle because it is difficult for blind users to aim their grasped objects. Finger point detection and tracking will be added to future systems to adaptively advise blind users to aim the object. Second, a text localization algorithm in an applicable blind-assistive system might prioritize stronger recall above precision. The distance between the blind persons and the obstacle will be measured using an ultrasonic sensor, and the distance will be played through earphones. If there is a tremor, the air pump motor will turn on and release the air from the air bag.

IV. RESULTS

End-users tested the device to determine its reliability in terms of its capacity to recognise obstacles and approaching targets. Experiments were carried out in a supervised setting by both professionals and blind persons. Of course, due to the dangers of conducting testing in an unstructured setting, we opted to conduct such surveys in a secure location solely to investigate gadget behaviour and demonstrate its suitability for assisting blind people. This study should be viewed as a preliminary qualitative test aiming at determining device reliability and estimating the quality and degree of information delivered to blind users.To achieve this, the user is not required to interpret the device's codified information and convert it to the actual level of attention (instead, the supervisor communicates to him the device's level of alert, which ranges from 1 to 5, and he must only decide what action to take at that level of alert).



The device's advantageous behaviour was demonstrated in the walking mode, which was notably useful for youthful and middle-aged persons. Furthermore, based on user response, it can be stated that the averaged comments were positive, particularly in terms of the offered codification's simplicity and speed of training. Of course, the proposed codification is merely an illustration of how the system could function. A tactile interface will be introduced in a future version of the device. This will allow for a thorough and thorough assessment of the device in order to calculate quantitative indicators for evaluating the multisensor approach's performance.

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V. CONCLUSION AND FUTURE WORK

. A tactile interface will be introduced in a future version of the device. This will allow for a thorough and thorough assessment of the device in order to calculate quantitative indicators for evaluating the multisensor approach's performance.Expert judgements, self-reports on performance quality, and evaluations of personal happiness will all be taken into account, as well as direct measures of indexes closely relevant to the task to be completed by the device (such as people and obstacle avoidance). The data fusion technique will also be optimized as part of the ongoing work (which could exploit the facility of the microcontroller adopted to implement a Fuzzy data-fusion paradigm instead of a set of crisp rules), ability for the user to choose the amount and redundancy of information provided by the device, as well as the ability to apply the multisensor method to different applications

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INNO SPACE
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Impact Factor: 8.165

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

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